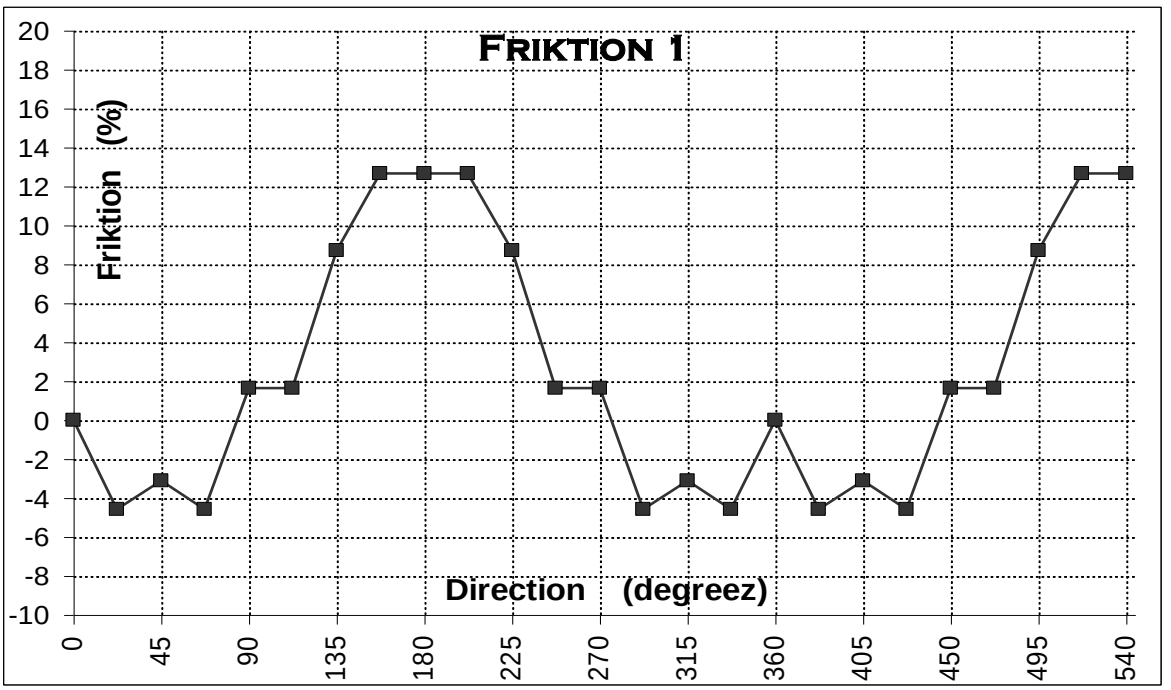
FRIKTION

THE LIGHTER SIDE OF BILLIARDS ALCOCK'S SPORTING REVIEW JULY 1913
BEING A SELECTION OF THE LATEST & MOST POPULAR FANCY & TRICK SHOTS KNOWN ON THE BILLIARD TABLE. BY SIDNEY T FELSTEAD BADMINTON MAGAZINE

One massé only i have included, it is George Gray's wonderful shot by which he goes right round the apex of the triangle & makes a cannon..... I have seen a good many professionals attempt this stroke, but Gray is the only one who can do it with any certainty.....

This raizes a question. **WHERE** would u place the triangle for Gray's massé? What i meen iz, which direction on the table givs the minimum bed to ball **FRIKTION**? This trick iz difficult. It takes a lot of well directed power, & u need everything on your side, helping, rather than hurting your effort. Obviously if u want the ball to skid out all that way to the apex of the triangle & still hav lots of reverse rotation to bring it back down the other side it might help if u pick the direction that givs the minimum friktion for the **OUTBOUND LEG**. Say that the eezyst direction for the massé for u iz clock-wize around the triangle. Then i reckon that u should place the triangle against the right-hand cushion. Naturally u would place it in the baulk area, koz the ball iz going to make a big permanent footprint (pit). Each corner of the triangle iz 60°. So, the above placement of the triangle will rezult in an initial ball direction 60° left of the direction of the nap. What iz the friktion in this direction, i meen compared to other direktions? Luckyly for me, i **MEZURED** the friktion for varyus directions a few years ago (for Billiards Arithmetically Treated), & the rezulting graff iz az follows.



Az karnt be seen, i have massaged the friktion figurs two ways. Firstly, the friktion with the **NAP** (ie at 00°) iz taken az being 100% by definition. Secondly, i hav called this value 0%. The **MAXIMUM** friktion woz against the nap, ie at 180°, which gave a figure of 112.7%, which i hav called 12.7%. Az kan be seen, the **MINIMUM** friktion woz at 22° & 67°. This woz almost 5% less than the friktion at 00°. But let's just say that the minimum friktion iz somewhere in the range 22° to 67°. Here the 22° iz 22°

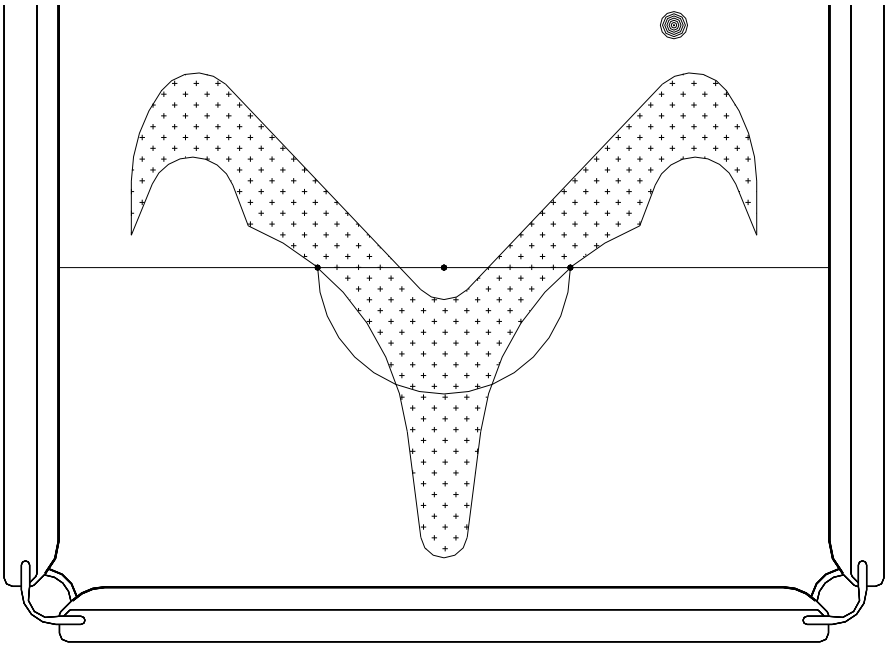
left of 00°, & equally 22° right of 00°. Now, az i sed, the first side of our **TRIANGLE** iz on an angle of 60°, & this iz the direction taken by the ball. But we karnt congratulate ourselvs yet. Koz, in the massé the ball iz sent off with backspin. And this backspin iz on about an angle of say 80°. The ball itself goze off at **60°**, along the first side of the triangle. So, from the cloth's point of view, the bottom of the ball iz initially skidding at an angle of say 70°. Later, when the ball gets to the apex, it iz hardly mooving, but still haz much of it's backspin. So, near the apex, the cloth thinks that the skidding iz at say 76°. The average skidding for the outbound leg iz say **73°**. If theze numbers are correct, & looking at the graff, placing the **TRIANGLE** against the **BOTTOM** cushion iz actually almost az good az placing it against the **RIGHT** side cushion, if u do the arithmetik. Anyhow, placing the triangle against the top-cushion, or the left cushion, would moov things over to the higher part of the graff, bad news for our massé (if right-handed). So, how duz this friktion factor affect a run of **NURSERY CANNONS**? Probly very little. The difference between the minimum & maximum values of friktion iz **18%**, which iz a big difference. We would probly be more familiar with massés on the top-cushion, where the friktion iz at its maximum (if u are aiming against the nap, ie at 180°). Therefore, massés on the top-cushion would be the most difficult on the table. If u kan play them well here then u will find them even eezyer on the other cushions. If so, then when we hav to play a massé on the side cushion, which we are not so familiar with, praps the qball would shoot out further than we wanted, & praps the qball would pass beyond our intended contact. This assumes that our aim, the initial trajectory, iz at say 90°. Friktion probly affects **SCREW-SHOTS** more so than massés. I know that more than once i hav kum to grief at top-of-the-table, due to an over-played screw-back, when potting the red into a top pocket, on say a 45° line. Uzually this haz happened on a strange table, with a newish slippery cloth. But, looking back i kan see that the Directional Friktion Factor **HURT** me. Which raizes an interesting question. If u wanted to set a new world's-record for a screw-back, what line would u pick for the stroke? Pretty obviously somewhere between 22° & 67°. I would favour something near **67°**, koz, on the way back, the qball would meet less **ROLLING REZISTANCE** (see Ch76 Roll). And what about loozers into the **BAULK POCKETS**. How many times hav u overplayed theze little suckers? Often, the angle looks a little too wide so naturally u hit a little harder, but az uzual the qball takes a wide trajectory & hits the side cushion. We all know that u get a wider Deflexion Angle for loozers into a baulk pocket than for loozers into the **TOP POCKETS**, but its hard to compensate, your natural instincts take over. But now that i know the cauze i find it eezyer for my grey matter to accept, & i rarely miss nowadays. Consider a half-ball loozer. The cueball iz rolling at say 1.000 m/s (ie velocity iz 1.000 m/s and topspin iz 1.000 m/s) & it kums away from the red ball at 0.500 m/s & at 60° (a bit less really) to its original line. But it haz the same topspin (1.000 m/s) az before it collided with the red (neglecting friktion & tranzmitted side). The new velocity of 0.500 m/s haz a component of 0.250 m/s on the original line, & 0.433 m/s at 90° to that line. Az the qball haz a topspin of 1.000 m/s, the bottom of the ball iz **SKIDDING** backwards at 1.000 minus 0.250, which iz 0.750 m/s. At the same time, the bottom of the qball iz skidding sideways (at 90°) at 0.433 m/s. So, the bottom of the ball iz actually skidding over the surface of the cloth at 0.866 m/s, at an angle of 150° (mezured from the original line of travel). Therefore, for a half-ball loozer into a top pocket, if the qball iz initially rolling at 00°, the initial angle of skidding

of the bottom of the cueball, after hitting the red, iz 150° (for all such half-ball kollizions). A look at the graff-chart for friktion shows that the **FRIKTION** acting on the **BOTTOM** of the ball iz (initially) nearly at its **MAXIMUM**, it iz 112.6%. For a half-ball loozer into a **BAULK POCKET**, if the cueball iz initially rolling at 180°, the initial angle of skidding of the bottom of the cueball iz 30°. For this angle, the friktion iz at its minimum, it iz minus 4.4%, or 95.6%. So the difference iz 95.6% minus 112.6%, which iz a difference of **MINUS 17%**. This iz a huge difference in friktion. It explains why the qball spreads so wide, ie why it takes such a large Deflexion Angle when you are trying to get a loozer into a baulk pocket. In all cases the qball's initial deviation (trajectory) iz always nearly 60° (for a half-ball contact), and then in all cases the excess of topspin cauzes it to kurv to the uzual final trajectory of approximately 33° (i am told). The difference iz that when there iz less friktion, the cueball will skid wider before it happily takes up its final trajectory. Hence, the final Deflexion Angle iz much more than this 33°, & it iz much more than our familiar Deflexion Angle of 35°, it iz possibly over 40° (for a short range from the red to the pocket, less for longer ranges). But, of course, the real reazon that the **QBALL SPREADS WIDER**, iz that we are more familiar with loozers into the top pockets. Otherwize we would be saying, why do loozers into the top pockets spread narrower. And what about loozers into the baulk pockets from the **REVERSE ANGLE**. U are in-hand. The red iz just out of baulk, near the brown spot. U place the qball near the green spot, & play a half-ball loozer into the baulk pocket. But, here the qball runs narrower than u thort, & hits the side cushion. The opposite error to the above. How many times hav u underplayed theze little suckers? This little trap iz probably more potent than the previous trap. Koz here u hav 2 effects working against u. If the qball iz initially rolling at 85°, the initial angle of skidding of the bottom of the qball, after collizion, iz 150° off, az uzual, ie 125°. For this angle, from the graff, the friktion iz about +6.5%, well below the +12.6% that we know so well. So, potentially, the Deflexion Angle should be wider than our familiar half-ball angle. But, the qball haz some **KOLLIZION-INDUCED ENGLISH**, az Jack Koehler would say (The Science of Pocket Billiards, 1989). This side-spin rezults in much **SpinKurv**. Az SpinKurv iz at a maximum on this trajectory, it rezults in much narrowing of the angle, hence the strange rezult. Try it. This applys to all contacts, ie quarter-ball, half-ball, three-quarter-ball etc. Its not really the Directional Friktion Factor Effect working here, it's the SpinKurv Effect. Actually, the Directional Friktion Factor Effect trys its best to widen the angle, to be perfectly fair to it. But, it gets worse. If the angle looks & iz widish, we may decide to hit harder, to widen the Deflexion Angle. But here we miss again. Koz the harder we hit the more kollizion induced side-spin, & the more SpinKurv. The initial kurv iz wider, but this iz piddly in comparison to the SpinKurv. If we hit harder still, enuff to double the red over to the other middle-pocket, we finally start to get some value, some wider angle, albeit still narrower than we think.

Pace of Tables

I woz having a good praktis & rolling mid-loozers nicely, the red rolling up the table & back again, stopping for another mid-loozer. But a few times the **RED** went into baulk. I got my home-made **BALL-RAMP**. I placed the end of the ramp on the baulk-line, & i rolled the red down the ramp straight up the table to the top-cush, the red rebounding

back to baulk, i drew a **CHALK** mark where the red stopped. I repeated this roll test about **30** times, mooving the ramp about 50mm further along the baulk line, & marking where the red stopped each time. This way, i checked the table roll & the cushion return along say 30 parallel lines. I repeated the tests several times. I knew that there would be some varyation in the returns, & i didn't expekt the chalk marks to form a nice straight line akross the table. But i woz **SHOCKED**, the chalk marks formed an ugly shaped **ZONE** az shown. Rolling up & down the centerline the red travels over the most worn & smoothest areas of the bed. Allso, the center of the top-cush (direktly behind theSpot) iz more worn & haz a higher friktion & a more efficient rebound. Hence the red's rebound allmost reeched the baulk cushion for some tests. But az kan be seen for some tests the red barely made it into baulk, here i am talking bout the centerline of the table only. Nearer the side cushions the red haz to travel over areas **RUFFED** up by players' hands, & the top-cush iz not az **WORN**, hence the shorter returns. The bed-cloth iz about **12 MONTHS OLD**. And the cush-cloth iz over **3 YEARS OLD** i guess. Obviously u wouldn't get such a large varyation in rebound with a **NEW** bed-cloth & **NEW** cush-cloth. I didn't **BRUSH** or **PAD** or **IRON** the table before the tests, it woz az iz from the previous day's play. I suspekt that ironing a table before play would remoov the **HAND MARKS** & reduce the varyation. So, old cush iz more worn & haz greater rebound just behind theSpot, & near the pockets. And old bed iz faster near the centerline & slower near the cushions. But i suspekt that a very very old bed etc would suffer less varyation. The red irons its own **PATH**, i noticed that if it iz rolled exaktly down the same line it goze say **200MM** further. Also, the red **WARMS** the cush-rubber with eech impakt, & i noticed that warmer rubber sends the red say **100MM** further. The **BLACK DOT** shows one bad roll. Here it woz obvious from the sight & sound of the red's cush impakt that it woz bad news, there woz a **DULLER** thud & the red woz **THROWN** off-line & with some **SIDESPIN**. I reckon that the red sank under the cushion, u get this sort of **TRAPPING** with new cush-cloth, but u don't expekt it with old cush-cloth. U karnt see sidespin on a redball, but i know about the sidespin koz i hav seen this sort of thing many times when uzing a **POOL BALL** (which haz a stripe). The sidespin & side-ways throw kums from the nap on the cush-cloth, but it duznt happen very often, something triggers it, but the cush-cloth etc looked & felt ok at that location. Anyhow, with older cush-cloths, be very wary of the area of cush behind theSpot.



Mac Rynkiewicz Cheltenham Club Notice Board Dec2004